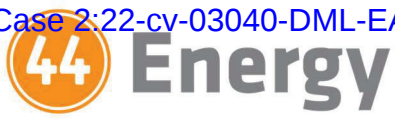


Exhibit A

Suppl. Decl. of B. Zigler, 11/12/24



Supplemental Declaration of Dr. Bradley Zigler

November 12, 2024

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1 Purpose of This Report

Counsel for Plaintiffs have asked me to review supplemental information about the model year (MY) 2017-2018 Chrysler Pacifica Plug-In Hybrid Electric (PHEV) vehicles (“Class Vehicles”) related to possible defects in the high-voltage (HV) battery pack resulting in fires. The purpose of this report is to consider this new information and supplement the opinions expressed in my January 19, 2024 Declaration (“Class Certification Report”) accordingly.

The supplemental information I considered includes:

- Part 573 Safety Recall Report and associated documents regarding FCA US LLC’s July 18, 2024 recall of MY2017-2018 Chrysler Pacifica PHEVs for continuing fire risk (“73B Recall”)
- Part 573 Safety Recall Report and associated documents regarding FCA US LLC’s July 18, 2024 recall of certain MY2019-2021 Chrysler Pacifica PHEVs for fire risk (“72B Recall”)
- FCA US LLC’s Answers to Plaintiffs’ First Set of Interrogatories
- FCA US LLC’s Supplemental Answers to Plaintiffs’ First Set of Interrogatories
- FCA US LLC’s Second Supplemental Answers to Plaintiffs’ First Set of Interrogatories
- FCA US LLC’s Third Supplemental Answers to Plaintiffs’ First Set of Interrogatories
- FCA_Pacifica_MDL-455508-455578
- Eldon G. Leaphart’s February 19, 2024 expert report
- Eldon G. Leaphart’s May 14, 2024 deposition transcript.

I understand FCA US LLC also made the following productions: FCA_Pacifica_MDL-455579-470959 on September 30, 2024; FCA_Pacifica_MDL-470960-474382 on October 2, 2024; and FCA_Pacifica_MDL-474383-477977 on October 2, 2024. I was unable to review and incorporate all relevant information from those productions into this supplemental report due to time constraints. I reserve the right to supplement my opinions once I complete review of these documents.

2 Supplemental Opinions

Based on the new information I have reviewed, certain opinions in my Class Certification Report are supplemented or amended as follows.

2.1 (Opinion 5.2) The HV Battery Pack is Common to All the Class Vehicles

FCA US LLC’s (“FCA”) 73B Recall supports my prior opinion that the Class Vehicles share a common HV battery pack.

On July 18, 2024, FCA issued the 73B Recall for MY2017-2018 Chrysler Pacifica PHEVs, which states that these vehicles “have continued to experience fires originating from the high voltage (‘HV’) battery after having the remedy for FCA US Recall ID Z11 (NHTSA Recall ID 22V-077) (‘Z11’) completed”.¹ The 73B Recall covers the same MY2017-2018 Pacifica PHEVs included in the Z11 Recall,² except for those vehicles that previously received an HV battery replacement under the Z11 Recall. The 73B Recall also implicates the same component in the fire risk—the HV battery pack—as implicated in the Z11 Recall. While the HV battery pack has twenty-five variations across the Class Vehicles as indicated by evolving part numbers, all variations were recalled for fire risk under both the 73B and Z11 Recalls (compare Figure 1 and Figure 2).

FCA US LLC 73B Involved Component Part Numbers

Chrysler Pacifica PHEV Battery Pack Assembly

Submitted on July 18, 2024

Battery Pack Assembly Part Numbers by Model Year

Part Numbers by Model Year	
2017	2018
05193143AA	68394027AA
05193143AB	68394027AB
05193143AC	68394027AG
05193143AD	68394027AH
05193143AE	68394027AI
05193143AF	68394027AJ
05193143AG	
05193143AH	
05193143AJ	
05193143AK	
05193143AL	
05193143AM	
05193143AN	
05193143AO	
05193143AS	
05193143AT	
05193143AU	
05193143AV	
05193143AW	

Figure 1. Recall 73B involved HV battery pack part numbers.³

¹ The Class Vehicles were previously recalled for fire risk on February 11, 2022 (“Z11 Recall”).

² The 73B Recall and the Z11 Recall both include MY2017-2018 vehicles produced between August 12, 2016, and August 7, 2018.

³ <https://static.nhtsa.gov/odi/rcl/2024/RMISC-24V536-1293.pdf>

FCA US LLC Z11 Involved Component Part Numbers
Chrysler Pacifica PHEV Battery Pack Assembly
Submitted on February 21, 2022

Battery Pack Assembly Part Numbers by Model Year

Part Numbers by Model Year	
2017	2018
05193143AA	68394027AA
05193143AB	68394027AB
05193143AC	68394027AG
05193143AD	68394027AH
05193143AE	68394027AI
05193143AF	68394027AJ
05193143AG	
05193143AH	
05193143AJ	
05193143AK	
05193143AL	
05193143AM	
05193143AN	
05193143AO	
05193143AS	
05193143AT	
05193143AU	
05193143AV	
05193143AW	

Figure 2. Recall Z11 involved HV battery pack part numbers.⁴

While the HV battery pack design and manufacturing changed to some extent over the MY2017-2018 Pacifica PHEV production timeframe resulting in twenty-five part number changes (Figure 1 and Figure 2),⁵ these changes did not alter the part's form, fit, and function ("FFF"). FFF is an engineering and manufacturing concept that refers to a set of characteristics or requirements that are essential for the design and compatibility of products, components, or systems. A high-level definition of FFF is included in the Code of Federal Regulations:

- **Form.** The form of a commodity is defined by its configuration (including the geometrically measured configuration), material, and material properties that uniquely characterize it.

⁴ <https://static.nhtsa.gov/odi/rci/2022/RMISC-22V077-7295.pdf>

⁵ See E. Leaphart Feb. 19, 2024 Report at 3.3-3.5.

- **Fit.** The fit of a commodity is defined by its ability to physically interface or connect with or become an integral part of another commodity.
- **Function.** The function of a commodity is the action or actions it is designed to perform.⁶

In my prior experience as a powertrain engineer with transmission and engine component and systems design and release responsibility at Ford Motor Company, the concept of FFF was utilized when making design changes to vehicle parts and components. Such design changes required changing the engineering part number to enable traceability and manage change control as part of the product lifecycle management process. Engineering part number changes were communicated to manufacturing to coordinate implementation, purchasing (if the part was externally sourced), finance to track cost changes, and service engineering to coordinate repair procedures and service parts. An important aspect of this process was determining whether the changes in the new part rendered it different in FFF from the old part such that the new and old parts were not interchangeable and required more extensive change control. If the FFF change in the new part was such that it was not backward compatible to be used in place of the old part, it required a “break” or “split” in service (with more extensive documentation for repair) where the old part must be maintained for servicing vehicles made prior to the split and the new part would be needed for servicing vehicles after the split.

In the automotive context with my experience at Ford, a FFF evaluation would include consideration such as:

- **Form.** The design change may include the form of the part, including shape, dimensions, materials, or finishes.
 - For example, if a design change involved adding a surface coating to improve corrosion resistance, that change would likely be equivalent for FFF and the new part would be backward compatible for the old part.
 - However, for example, if a design change involved changing the material from a high-grade steel to a lower-grade steel or plastic, that change would not likely be equivalent for FFF and the new part would not be backward compatible for the old part.
- **Fit.** The design change may affect how the part connects to other parts or fits within an assembly of parts.
 - For example, if a design change involved opening up a dimensional tolerance for a bolt hole to be more accommodating for manufacturing variance and ease of assembly, that change would likely be equivalent for FFF and the new part would be backward compatible for the old part.
 - However, for example, if a design change involved changing an electrical connector on a wire harness to incorporate a new self-locking feature, that change would likely not be equivalent for FFF and the new part would not be backward compatible for the old part.

⁶ <https://www.ecfr.gov/current/title-22/chapter-I/subchapter-M/part-120/subpart-C/section-120.42>

- **Function.** The design change may affect how the part functions.
 - For example, if a design change involved increasing load capacity of a bearing beyond minimum design requirements, that change may be equivalent for FFF and the new part would be backward compatible for the old part.
 - However, for example, if a design change involved changing a wire harness to feed 4 wires to a sensor instead of 3 wires, that change would likely not be equivalent for FFF and the new part would not be backward compatible for the old part.

In the Ford engineering change control system, a part design change where FFF was equivalent and the new part was backward compatible for the old part would result in a minor change to the engineering part number, with the suffix of the part numbers changing from “-AA” to “-AB”. As an example, engineering part number E9FA-6108-**AA** would become E9FA-6108-**AB**. However, if the part design change meant FFF was not equivalent, and the new part was not backward compatible for the old part, it would result in a major change to the engineering part number with the suffix changing from “-AA” to “-BA”. As an example, engineering part number E9FA-6108-**AA** would become E9FA-6108-**BA** and a break would be made between “-AA” and “-BA” usage in production and service. If the major part change is even more significant, a new engineering part number prefix would be assigned. For example, the old part number **E9FA**-6108-AA becomes the new part number **F2DA**-6108-AA.

At Ford, these design changes were also considered and implemented in service repair procedures and service part numbers. Service part numbers were not the same as engineering part numbers but followed similar change control processes. The separation of service and engineering part numbers reflected the different nature of implementing a design change in manufacturing, where a factory may be producing over 100 engines per hour and a change is rapidly implemented, versus service, where design changes may impact service procedures and training for dealership technicians, as well as procuring, warehousing, distributing, and retail sales of service parts. At Ford, service part numbers were similar to engineering part numbers, but generally contained a “Z” in the prefix as a clear identifier that this was a service part. For example, engineering part E9**FA**-6108-AA may have counterpart service part E9**ZZ**-6108-A. As illustrated above, if an engineering part design change was equivalent for FFF and backward compatible resulting in a minor part number change (e.g., E9FA-6108-**AA** advanced to E9FA-6108-**AB**), then the service part number would not change (e.g., service part number remained E9ZZ-6108-A). In that case, existing stock of the old part could be exhausted as it sold, and the new part substituted for service purposes without coordination (e.g., without changing service procedures or retail sales documentation).

However, if FFF was not equivalent and the new part was not backward compatible for the old part (e.g., engineering E9FA-6108-**AA** advanced to E9FA-6108-**BA**), then then a break was documented for service purposes and both the old service part (e.g., E9ZZ-6108-A) and a new service part (e.g., E9ZZ-6108-B) would be utilized. This required extensive documentation for service to identify when the split was made in production and meant two different service parts had to be procured, warehoused, distributed, and cataloged for sale. Because of the associated complexity and costs, equivalent FFF and backward compatibility was highly encouraged, with splits between old and new generation (incompatible) designs and increasing complexity of service part numbers approved only when they could not be avoided. These major service part number changes and splits were almost always coordinated with breaks between

model years. In my over decade long career at Ford, I was never involved in a major service part number split mid-model year. Such a design change within a model year would have required extensive service engineering effort (e.g., same model year vehicles requiring different generation service parts, identified by a vehicle identification number (VIN) cutoff).

While the above example illustrated Ford's engineering and service change control processes for part numbers, my experience knowing and studying with engineering peers at General Motors and Chrysler confirmed that others in the industry used similar evaluation of FFF for backward compatibility and part number change control practices, even if the specific part numbering methods themselves differed.

Here, the fact that a single service part, 68488189AA Hybrid Battery Kit,⁷ is compatible for all Class Vehicles reaffirms that all twenty-five versions of the HV battery pack share the same FFF. If that were not the case, a different service part would be required for use in older vehicles where the updated part's design and manufacturing changes rendered it incompatible with older generation vehicles. Nineteen part number changes were made to the MY2017 HV battery pack alone, with the part numbers sequencing from 059319141AA ending in "AA" through "AW" (Figure 1 and Figure 2). As explained above, in my experience as a powertrain engineer at Ford Motor Company and with an understanding of common industry practices, this type of part number suffix progression signifies backward compatibility, where the new part is compatible in FFF with the old part. So, while the HV battery pack in a MY2017 Pacifica PHEV at the start of production was not identical to the one in a later-produced MY2017 or MY2018 Pacifica PHEV, the battery pack was substantially similar such that the changes over time did not alter the part's FFF and a single common service part works in each of those vehicles.

Additionally, the MY2018 HV battery pack part number changed six times (Figure 1 and Figure 2), progressing from 68394027AA, ending in "AA" through "AJ". In my investigation to confirm whether part number 68394027AA (the first MY2018 HV battery pack) was backward compatible for FFF with part number 059319141AW (the last MY2017 HV battery pack part number), I learned that the 9-digit number change across the part numbers signified a larger design change, typically coordinated and bundled with other changes for a new model year and requiring a Failure Mode Effects Analysis (FMEA) review and updated Design Verification Plan and Report (DVP&R). However, the FFF for backward compatibility would still be reflected in the applicable service part number. If a single service part number covered both MY2017 and MY2018 vehicles, that signifies the new MY2018 HV battery pack is backward compatible for FFF with prior versions/part numbers. Otherwise, two service parts would be created, one servicing vehicles before the compatibility split and another one servicing vehicles after the split. And the fact that the service part (the Hybrid Battery Kit) can simply swap in the "newest" HV battery⁸ indicates that these HV batteries are FFF equivalent.

As I previously opined, a single HV battery kit service part (SKU: 68488189AA), is compatible with all Class Vehicles. To date, FCA's original equipment manufacturer Mopar still lists the 68488189AA Hybrid Battery Kit service part as the replacement part for MY2017-MY2025 Pacifica Hybrid vehicles (Figure 3).

⁷ The Hybrid Battery Kit contains the "newest" HV battery, an I-Sheet, and a manual service disconnect service kit. See, e.g., FCA_Pacifica_MDL-016538 (Change Notice Worksheet).

⁸ See, e.g., FCA_Pacifica_MDL-016538 (Change Notice Worksheet).

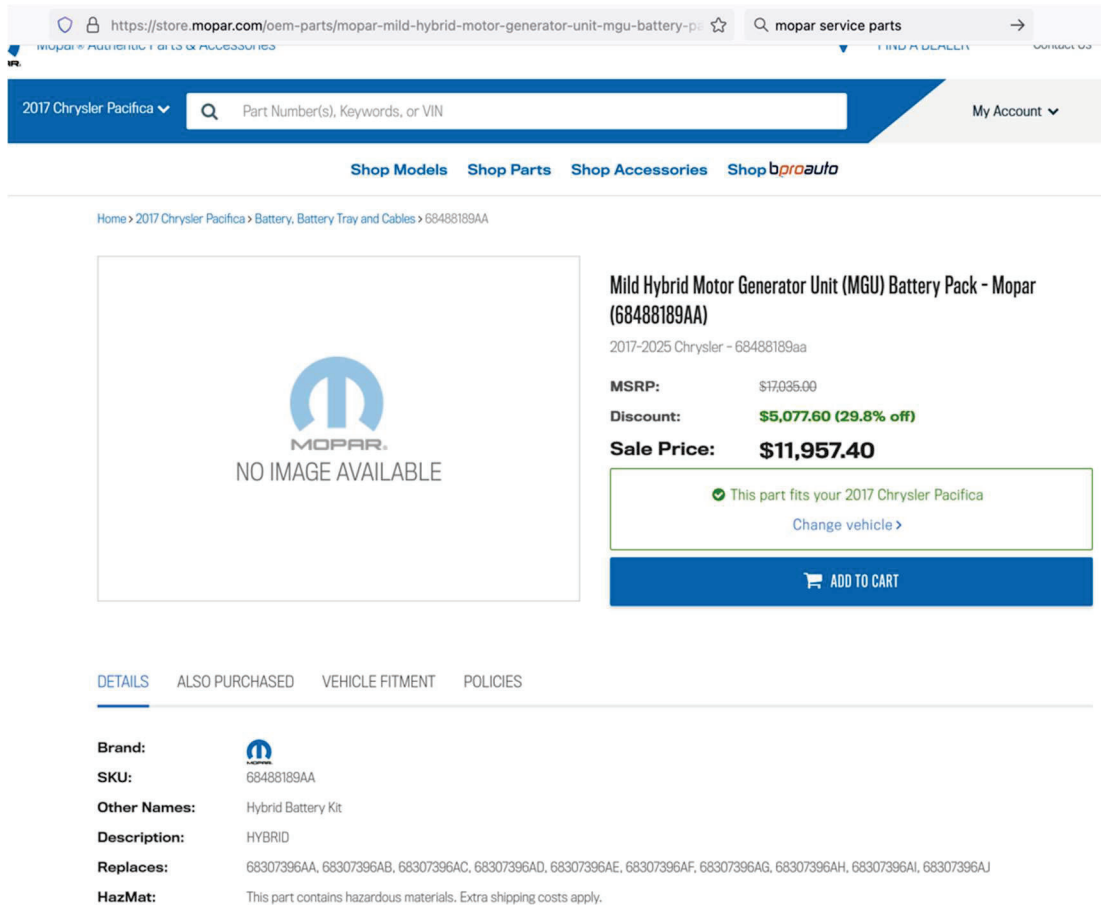


Figure 3. Mopar website screenshot for the HV battery pack service part.⁹

To further verify my findings regarding the appropriate service part,¹⁰ I also researched the current service parts for three Pacifica PHEVs via a paid subscription portal for independent mechanics to view current Stellantis OEM diagnostics, service instructions, and service parts.¹¹ Specifically, I located and compared the HV battery kit numbers for three vehicles: MY2017 Pacifica PHEV (Figure 4); MY2018 Pacifica PHEV (Figure 5); and MY2023 Pacifica PHEV (Figure 6).

⁹ <https://store.mopar.com/oem-parts/mopar-mild-hybrid-motor-generator-unit-mgu-battery-pack-68488189aa?c=Zz1lbGVjdHJpY2FsJnM9YmF0dGVyeS1iYXR0ZXJ5LXRxYXktYW5kLWNhYmxlcYzSPTEmbj1TZWFyY2ggUmVzdWx0cyZhPWNoZlZbGVyJm89cGFjaWZpY2EmeT0yMDE4JnQ9aHlicmlkLXRvdXJpbmctcGx1cyZlPTMtNmwtZlZlZWx1Y3RyaWMtZ2Fz>

¹⁰ <https://store.mopar.com/>

¹¹ <https://stellantisio.com/iop/app/landing>

008 - Electrical - 1025 - Parts, Hybrid Battery, Battery Cable Chargers & Related

U - United States

Item	Description	Part Number	Notes	Qty	Super	Tech	Info	Eng	Trans	Line	Series	Body	Trim
5	BATTERY KIT, Hybrid, [XDQ]	68307396AA		1						CE		53	

Figure 4. OEM subscription service portal information for MY2017 Pacifica Hybrid Battery Kit.

008 - Electrical - 1025 - Parts, Hybrid Battery, Battery Cable Chargers & Related

U - United States

Item	Description	Part Number	Notes	Qty	Super	Tech	Info	Eng	Trans	Line	Series	Body	Trim
5	SERVICE DISCONNECT, M SD Kit, [XDQ]	68307507AA		1						CE		53	
6	BATTERY KIT, Hybrid [XDQ]	68307396AH		1						CE		53	
	[XDQ], [AB7]	68307396AH		1						CE		53	

Figure 5. OEM subscription service portal information for MY2018 Pacifica Hybrid Battery Kit.

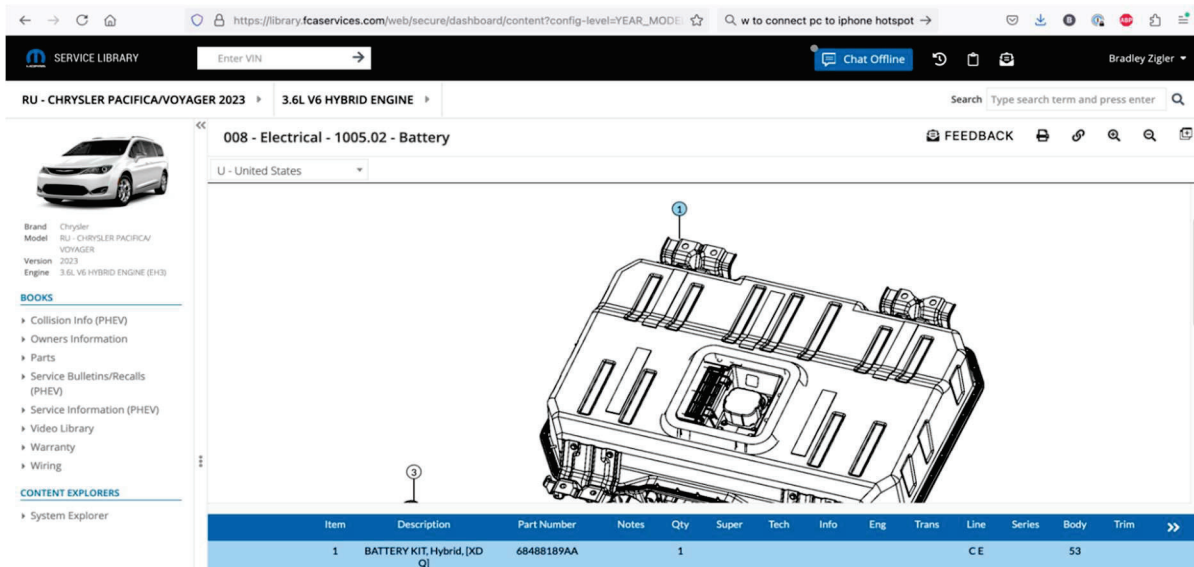


Figure 6. OEM subscription service portal information for MY2023 Pacifica Hybrid Battery Kit.

The HV battery kit part numbers for MY2017 and MY2018 are 68307396AA and 68307396AH, respectively, while the HV battery kit part number for MY2023 is 68488189AA. Even though the part numbers differ between the model years, the current service part number 68488189AA replaces a number of prior versions, including 68307396AA and 68307396AH (the HV battery kit for MY2017 and MY2018), and matches the service part number for the MY2023 (Figure 3). This confirms the 68488189AA service part is backward compatible for form, fit, and function to service MY2017-2018 Pacifica PHEVs.

In my investigation, I also visited the Denver area FCA dealer AutoNation Chrysler Dodge Jeep RAM Southwest and inquired about the HV battery pack service part number for VINs from four Pacifica PHEVs:

- MY2017 - 2C4RC1N71HR822317
- MY2018 - 2C4RC1N78JR118217
- MY2023 - 2C4RC1L7XPR622439
- MY2024 - 2C4RC1N75RR200367

The FCA dealership service parts counter confirmed their online part cataloging system listed the same service part number for all four vehicles.

In his deposition testimony, FCA's expert Eldon Leaphart stated that the recommended HV battery pack service part for MY2018 vehicles had changed and was no longer the 68488189AA service part.¹² The basis for this position is unclear and Mr. Leaphart's Feb. 19, 2024 report does not state or explain this. I have no information to conclude the 68488189AA service part is not suitable or compatible with the MY2018 Pacifica PHEV. If presented with further information, I reserve the right to supplement my opinions.

¹² May 14, 2024 E. Leaphart Deposition Tr. at 175:2-181:17.

The 73B Recall and my additional investigation supports my prior opinion that the Class Vehicles share a common HV battery pack, with the currently available HV battery service part being backward compatible for all MY2017 and MY2018 Pacifica PHEVs.

2.2 (Opinion 5.3) FCA Safety Recall Report for MY 2017-2018 Chrysler Pacifica Hybrid Vehicles Covers All Class Vehicles

The 73B Recall reaffirms my opinion that all Class Vehicles are subject to recall for fire risk. The 73B Recall encompasses all MY2017-2018 produced between August 12, 2016 (when production of this model first began) and August 7, 2018 (when MY2018 production ended). This is the same production period as the MY2017-2018 Pacifica PHEVs included in the Z11 Recall but excludes vehicles that previously received an HV battery replacement under the Z11 Recall.

Simultaneous to the 73B Recall, FCA also issued the 72B Recall, which included certain MY2019-2021 Pacifica PHEVs with the same fire risk arising from the vehicles' HV battery pack,¹³ saying:

Some 2019 - 2021MY Chrysler Pacifica Plug-In Hybrid Electric Vehicles ("PHEV") may have been built with a High Voltage ("HV") battery pack which may contain cells manufactured with a folded or torn anode tab.

The suspect period began on April 30, 2018, when production of Chrysler Pacifica PHEVs manufactured with suspect HV battery packs began, and ended on October 26, 2021, when production of Chrysler Pacifica PHEVs manufactured with suspect HV battery packs ended. Vehicle and HV battery pack production records were used to determine the suspect period.

Similar vehicles not included in the recall are not PHEVs, were built after the suspect vehicle production period, or are previously covered under FCA US Recall ID Z11 (NHTSA Recall ID 22V-077) ("Z11").¹⁴

The 72B Recall indicates the fire risk is not limited to just MY2017 and MY2018 Pacifica PHEVs.

In the Z11 Recall, the affected population included 16,741 vehicles (Figure 7).^{15,16} In the 73B Recall, the affected population included 15,910 vehicles (Figure 8).^{17,18} This reflects an 831-vehicle difference between the recall populations. This discrepancy can be explained by a myriad of factors, such as exported, scrapped, stolen, and lost vehicles, and vehicles that had their HV battery packs replaced under Recall Z11 (see Figure 7 and Figure 8). This minor difference in Class Vehicle population does not alter my opinion that the fire risk impacts all Class Vehicles.

¹³ <https://www.nhtsa.gov/recalls?nhtsald=24V538000>

¹⁴ <https://static.nhtsa.gov/odi/rcl/2024/RCLRPT-24V538-4452.PDF>

¹⁵ <https://static.nhtsa.gov/odi/rcl/2022/RCLRPT-22V077-3486.PDF>

¹⁶ FCA_Pacifica_MDL-455514

¹⁷ <https://static.nhtsa.gov/odi/rcl/2024/RCLRPT-24V536-8355.PDF>

¹⁸ FCA_Pacifica_MDL-455577

Recall Summary Report for Campaign#: Z11

Source: Launched

Campaign#	Z11	VINs Live Date	Feb 18, 2022	Market	Global		
Campaign Type	1	Safety Campaign	Description				
Completion Rate	84.8%	#Vehicles	19,808	#Repaired	15,878	#SSEO	1,082
#Unsold Vehicles	1	#Unsold Repaired	0	Parts Available	Yes	Emission Related	No
Last Activity	Aug 16, 2024						

Campaign Details

A vehicle may experience a fire potentially originating in the center of the vehicle underbody with the ignition in the "OFF" mode.

Repair Description

FCA US will conduct a voluntary safety recall on all affected vehicles to update the High Voltage Battery Pack Control Module ("BPCM") software to monitor battery pack assembly operational status for conditions that could lead to a fire in the battery pack assembly. FCA US will inspect and, if necessary, replace the battery pack assembly. Until the remedy is complete, the Company is advising owners of these hybrid vehicles to refrain from recharging them, and to park them away from structures and other vehicles.

Safety Risk

A vehicle fire can result in increased risk of occupant injury and/or injury to persons outside the vehicle, as well as property damage.

Completion Rate

Built for Market	Market Description	#Vehicles	#Repaired	#Scrapped	#Stolen	#Export	#Unable to Locate	#Other	#SSEO	Completion Rate
B	International	750	415	16	0	2	0	0	18	56.7%
C	Canada	2,317	1,860	46	1	0	22	0	47	81.9%
U	US	16,741	13,603	842	3	120	160	52	1,017	86.5%
All Built for Markets		19,808	15,878	904	4	122	182	52	1,082	84.8%

Repair Status

Repair Status	#Vehicles	Total Vehicles	Percentage
EXPORT	122	19,808	0.6%
INSPECTED / NO REPAIR	12	19,808	0.1%
OPEN	2,666	19,808	13.5%
OWNER APATHY	52	19,808	0.3%
REPAIRED	15,866	19,808	80.1%
SCRAPPED	904	19,808	4.6%
STOLEN	4	19,808	0.0%
UNABLE TO LOCATE	182	19,808	0.9%

US Repair Status

Repair Status	#Vehicles	Total Vehicles	Percentage
EXPORT	120	16,741	0.7%
INSPECTED / NO REPAIR	11	16,741	0.1%
OPEN	1,961	16,741	11.7%
OWNER APATHY	52	16,741	0.3%
REPAIRED	13,592	16,741	81.2%
SCRAPPED	842	16,741	5.0%
STOLEN	3	16,741	0.0%
UNABLE TO LOCATE	160	16,741	1.0%

Model Year/Family Distribution

Model Year	Family	Family Description	#Vehicles	#Repaired	#Scrapped	#Stolen	#Export	#Unable to Locate	#Other	#SSEO	Completion Rate
2017	RU	CHRYSLER PACIFICA/VOYAGER	4,078	2,889	550	1	23	56	18	592	82.9%
2018	RU	CHRYSLER PACIFICA/VOYAGER	15,730	12,989	354	3	99	126	34	490	85.2%
All Model Year/Families			19,808	15,878	904	4	122	182	52	1,082	84.8%

Model Year/Family/Built for Market Distribution

Model Year	Family	Family Description	Built for Market	#Vehicles	#Repaired	#Scrapped	#Stolen	#Export	#Unable to Locate	#Other	#SSEO	Completion Rate
2017	RU	CHRYSLER PACIFICA/VOYAGER	International	15	1	14	0	0	0	0	14	100.0%
2017	RU	CHRYSLER PACIFICA/VOYAGER	Canada	739	594	26	0	0	8	0	26	83.3%
2017	RU	CHRYSLER PACIFICA/VOYAGER	US	3,324	2,294	510	1	23	48	18	552	82.8%
2018	RU	CHRYSLER PACIFICA/VOYAGER	International	735	414	2	0	2	0	0	4	56.6%
2018	RU	CHRYSLER PACIFICA/VOYAGER	Canada	1,578	1,266	20	1	0	14	0	21	81.3%
2018	RU	CHRYSLER PACIFICA/VOYAGER	US	13,417	11,309	332	2	97	112	34	465	87.3%
All Model Year/Families/Markets				19,808	15,878	904	4	122	182	52	1,082	84.8%

Sold/Unsold Information

Global Sold Volume	19,807	US Sold Volume	16,741
Global Unsold Volume	1	US Unsold Volume	0
Global Unsold Repaired	0	US Unsold Repaired	0
Global Unsold Volume (at VINs Live)	1	US Unsold Volume (at VINs Live)	0

Figure 7. Z11 Recall vehicle population summary.¹⁹¹⁹ FCA_Pacifica_MDL-455514

Recall Summary Report for Campaign#: 73B

Source: Launched

Campaign#	73B	VINs Live Date	Jul 25, 2024	Market	US,Canada,International		
Campaign Type	1	Safety Campaign	Description	2017-2018 RU PHEV Z11 Remedy Effectiveness			
Completion Rate	0.0%	#Vehicles	18,953	#Repaired	0	#SSEO	1,537
#Unsold Vehicles	1	#Unsold Repaired	0	Parts Available	No	Emission Related	No
Last Activity	Aug 12, 2024						

Campaign Details

A folded or torn anode tab may result in the generation of lithium by-product over time. This defect, along with a second unidentified factor, may lead to an internal short within the pack and may result in a vehicle fire.

Repair Description

FCA US will conduct a voluntary safety recall on all affected vehicles to update the HV Battery Pack Control Module (BPCM) with revised software to monitor battery pack assembly operational status for conditions that could lead to a fire in the battery pack assembly. FCA US will inspect and, if necessary, replace the battery pack assembly. Until the remedy is complete, FCA US is advising owners of these hybrid vehicles to refrain from recharging them, and to park them away from structures and other vehicles.

Safety Risk

A vehicle fire may increase the risk of injury to occupants and persons outside of the vehicle, as well as property damage.

Completion Rate

Built for Market	Market Description	#Vehicles	#Repaired	#Scrapped	#Stolen	#Export	#Unable to Locate	#Other	#SSEO	Completion Rate
B	International	750	0	16	0	3	0	1	20	0.0%
C	Canada	2,293	0	67	1	0	143	0	68	0.0%
U	US	15,910	0	1,071	5	258	435	115	1,449	0.0%
All Built for Markets		18,953	0	1,154	6	261	578	116	1,537	0.0%

Repair Status

Repair Status	#Vehicles	Total Vehicles	Percentage
EXPORT	261	18,953	1.4%
OPEN	16,838	18,953	88.8%
OWNER APATHY	116	18,953	0.6%
SCRAPPED	1,154	18,953	6.1%
STOLEN	6	18,953	0.0%
UNABLE TO LOCATE	578	18,953	3.0%

US Repair Status

Repair Status	#Vehicles	Total Vehicles	Percentage
EXPORT	258	15,910	1.6%
OPEN	14,026	15,910	88.2%
OWNER APATHY	115	15,910	0.7%
SCRAPPED	1,071	15,910	6.7%
STOLEN	5	15,910	0.0%
UNABLE TO LOCATE	435	15,910	2.7%

Model Year/Family Distribution

Model Year	Family	Family Description	#Vehicles	#Repaired	#Scrapped	#Stolen	#Export	#Unable to Locate	#Other	#SSEO	Completion Rate
2017	RU	CHRYSLER PACIFICA/VOYAGER	4,004	0	610	1	50	155	29	690	0.0%
2018	RU	CHRYSLER PACIFICA/VOYAGER	14,949	0	544	5	211	423	87	847	0.0%
All Model Year/Families			18,953	0	1,154	6	261	578	116	1,537	0.0%

Model Year/Family/Built for Market Distribution

Model Year	Family	Family Description	Built for Market	#Vehicles	#Repaired	#Scrapped	#Stolen	#Export	#Unable to Locate	#Other	#SSEO	Completion Rate
2017	RU	CHRYSLER PACIFICA/VOYAGER	International	16	0	14	0	0	0	0	14	0.0%
2017	RU	CHRYSLER PACIFICA/VOYAGER	Canada	734	0	33	0	0	45	0	33	0.0%
2017	RU	CHRYSLER PACIFICA/VOYAGER	US	3,255	0	563	1	50	110	29	643	0.0%
2018	RU	CHRYSLER PACIFICA/VOYAGER	International	735	0	2	0	3	0	1	6	0.0%
2018	RU	CHRYSLER PACIFICA/VOYAGER	Canada	1,559	0	34	1	0	98	0	35	0.0%
2018	RU	CHRYSLER PACIFICA/VOYAGER	US	12,655	0	508	4	208	325	86	806	0.0%
All Model Year/Families/Markets				18,953	0	1,154	6	261	578	116	1,537	0.0%

Sold/Unsold Information

Global Sold Volume	18,952	US Sold Volume	15,910
Global Unsold Volume	1	US Unsold Volume	0
Global Unsold Repaired	0	US Unsold Repaired	0
Global Unsold Volume(at VINs Live)	1	US Unsold Volume(at VINs Live)	0

Figure 8. 73B Recall vehicle population summary.²⁰²⁰ FCA_Pacifica_MDL-455577

In the Z11 Recall, FCA estimated that 100% of the recalled vehicles had the fire risk defect (Figure 9), describing the defect as “A vehicle may experience a fire, even with the ignition in the “OFF” mode.”²¹ But in the 73B Recall, it estimates that 5% of the recalled vehicles have the fire risk defect (Figure 10).²²

Population :

Number of potentially involved : 16,741
Estimated percentage with defect : 100 %

Figure 9. Z11 Recall information about potentially involved population and estimated percentage with defect.²³

Population :

Number of potentially involved : 15,910
Estimated percentage with defect : 5 %

Figure 10. 73B Recall information about potentially involved population and estimated percentage with defect.²⁴

From the documents I have been able to review up to the point of this supplemental report, it is not yet clear how FCA reduced the estimated percentage of vehicles with the fire risk defect between the two Recalls. At the time of the Z11 Recall, FCA stated the root cause of the fire risk was unknown, but now in the 73B Recall, it identifies a folded or torn anode tab in the HV battery pack that, along with a second unidentified factor, may lead to an internal short within the pack that can result in a vehicle fire (Figure 11).²⁵

Description of Defect :

Description of the Defect :	A folded or torn anode tab may result in the generation of lithium by-product over time. This defect, along with a second unidentified factor, may lead to an internal short within the pack and may result in a vehicle fire.
FMVSS 1 :	NR
FMVSS 2 :	NR
Description of the Safety Risk :	A vehicle fire may increase the risk of injury to occupants and persons outside of the vehicle, as well as property damage.

Figure 11. 73B Recall defect description.²⁶

²¹ <https://static.nhtsa.gov/odi/rcl/2022/RCLRPT-22V077-3486.PDF>

²² <https://static.nhtsa.gov/odi/rcl/2024/RCLRPT-24V536-8355.PDF>

²³ <https://static.nhtsa.gov/odi/rcl/2022/RCLRPT-22V077-3486.PDF>

²⁴ <https://static.nhtsa.gov/odi/rcl/2024/RCLRPT-24V536-8355.PDF>

²⁵ <https://static.nhtsa.gov/odi/rcl/2024/RCLRPT-24V536-8355.PDF>

²⁶ <https://static.nhtsa.gov/odi/rcl/2024/RCLRPT-24V536-8355.PDF>

In his deposition testimony, FCA's expert Eldon Leaphart stated that his understanding at the time was that 100% of the vehicles subject to the Z11 Recall have a fire risk:

Q. *"Do you interpret the estimated percentage with the defect where it says a hundred percent to mean that a hundred percent of those vehicles will have a fire?"*

A. *"No. I really interpret it as especially because there has been no single root cause identified, that vehicles in this date range have the potential, given that the single – a single root cause has not been identified, it may have factors that could contribute to this particular defect, mainly a fire."*

Q. *"So do you understand that a hundred percent of these vehicles, the vehicles that are subject to this recall, have the -- have a fire risk? Not that they're going to have a fire, but have a fire risk?"*

A. *"That is my understanding."*²⁷

Supplemental documents produced confirm that the fire risk in the Class Vehicles arises because "a folded or torn anode tab may result in the generation of lithium by-product over time" and "this defect, along with a second defect, may lead to an internal short within the pack and may result in a vehicle fire" (Figure 12Figure 12).²⁸ FCA acknowledges the Z11 Recall software update "is not robust enough to catch abnormalities within the [HV battery] pack" and, critically, FCA identifies no mechanism that can detect—out of the entire Class Vehicle population—those whose HV battery packs contain this anode defect and/or present the conditions FCA says are necessary for a fire to occur.²⁹

Thus, Recalls 73B and 72B, as well as the supplemental information regarding the Z11 Recall and software update's ineffectiveness to sufficiently detect battery failures to prevent fire affirm my opinion that the entire MY2017-2018 population is still subject to fire risk.

²⁷ May 14, 2024 E. Leaphart Deposition Tr. at 149:7-149:23.

²⁸ FCA_Pacifica_MDL-455557

²⁹ FCA_Pacifica_MDL-455557

INV# 111088: 2017-2018MY RU PHEV Z11 REMEDY EFFECTIVENESS		
Problem Statement: Some 2017-2018MY Chrysler Pacifica PHEVs continue to have fires originating from the HV battery after having the Z11 remedy performed.		
Source: Dapis Fire Tool	Preliminary Responsible: Supplier	BICEEPR: Powertrain
Potential Failure Mode: A folded or torn anode tab may result in the generation of lithium by-product over time. This defect, along with a second defect, may lead to an internal short within the pack and may result in a vehicle fire.		
Consequence: A vehicle fire may increase the risk of injury to occupants and persons outside of the vehicle, as well as property damage.		
Detectability: None		
Root Cause: LGES has stated the most likely root cause of Z11 is a folded or torn anode tab plus another defect. The current remedy software for Z11 is not robust enough to catch abnormalities within the pack that may lead to a vehicle fire		
Test & Analysis Summary: Data analysis of field vehicles Pack teardown of post remedy incident Cell and module CT (ongoing) Cell teardown (to be completed after CT scans) Analysis of returned packs and anode detection rates of each DTC NHTSA Recall Query received March 20, 2024		
Corrective Actions: LGES proposes continuous improvement iteration release to current Z11 software		
Recommendation: Conduct a voluntary safety recall on all affected vehicles		

Figure 12. FCA review of Z11 Recall effectiveness.³⁰

2.3 (Opinion 5.4) FCA's Analysis of HV Battery Pack Manufacturing Defects Prompted the Recall of All Class Vehicles

The Z11 Recall was prompted by fires in twelve Class Vehicles.^{31,32} In the 73B Recall, FCA identified seven fires that originated from the Class Vehicles' HV battery packs after the Z11 Recall software update was performed, including 4 injuries.³³ In its July 11, 2024 internal report, FCA identified "23 total incidents of fire originating from the HV battery" and "11 fires received since Z11, with 7 of those occurring after the remedy was completed."³⁴ On May 23, 2024, FCA learned about an eighth vehicle fire alleged to have occurred after the Class Vehicle obtained the Z11 Recall software upgrade.³⁵ Based on this information, there have been twenty-four total fires in Class Vehicles to date, eight of which are suspected to have occurred post-Z11 Recall repair.

Supplemental documents indicate the "fires continue to occur since launching Z11 remedy, most of which have had the Z11 remedy completed," as shown in Figure 13.³⁶

³⁰ FCA_Pacifica_MDL-455557

³¹ <https://static.nhtsa.gov/odi/rcl/2022/RCLRPT-22V077-3486.PDF>

³² FCA_Pacifica_MDL-455537

³³ FCA_Pacifica_MDL-455527 to FCA_Pacifica_MDL-455574

³⁴ FCA_Pacifica_MDL-455568

³⁵ FCA US LLC's Third Supplemental Answers to Plaintiffs' First Set of Interrogatories, Interrog. No. 1.

³⁶ FCA_Pacifica_MDL-455567

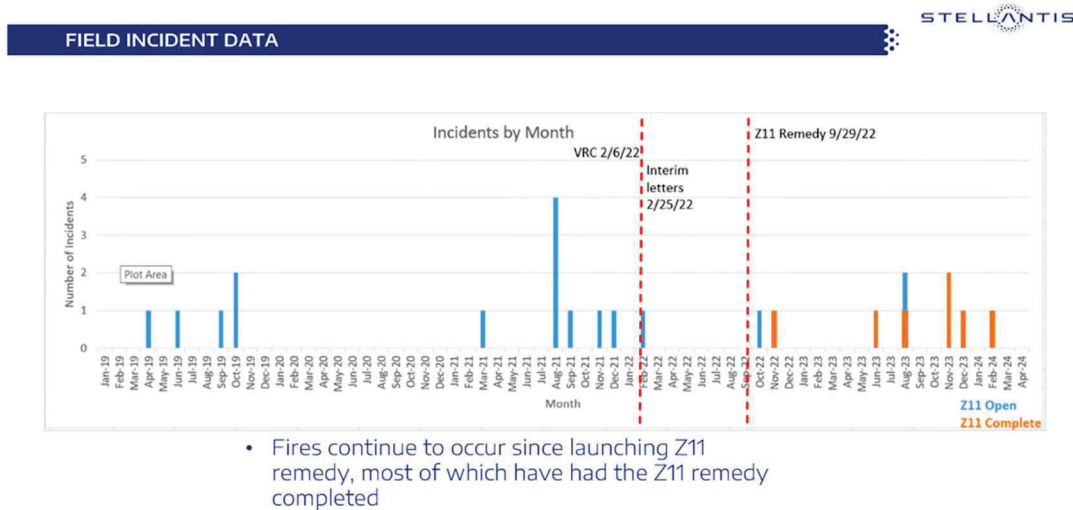
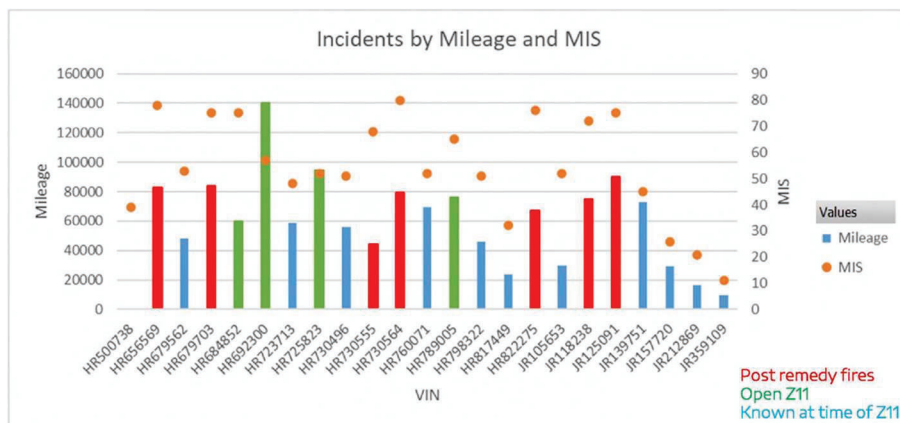


Figure 13. FCA analysis of HV battery fires for MY2017-2018.³⁷

FCA's analysis of 23 Class Vehicles fires (as of May 22, 2024), showed the Vehicles' average time in service (TIS) was 4.5 years and the average mileage was 61,000, as shown in Figure 14.³⁸



- 23 total incidents of fires originating from the HV battery
- 11 fires received since Z11, with 7 of those occurring after the remedy was completed
- Average TIS of failures: 4.5 years
- Average mileage of failures: 61,000 miles

Figure 14. FCA analysis of first 23 fire incidents.³⁹

FCA's analysis further states, "Weibull analysis shows 0.8%" (failure) "at 15 YIS" (years in service) "and predicts 158 future failures" (Figure 15).⁴⁰ A Weibull distribution is a statistical analysis tool to model a

³⁷ FCA_Pacifica_MDL-455567

³⁸ FCA_Pacifica_MDL-455540

³⁹ FCA_Pacifica_MDL-455540

⁴⁰ FCA_Pacifica_MDL-455569

broad range of random variables, largely related to time to failure or time between events, in a probability distribution. FCA's analysis further predicted "80 future failures based on age of population" and provided the "key take away" that the "trendline shows failure rate is remaining constant" (Figure 15).⁴¹

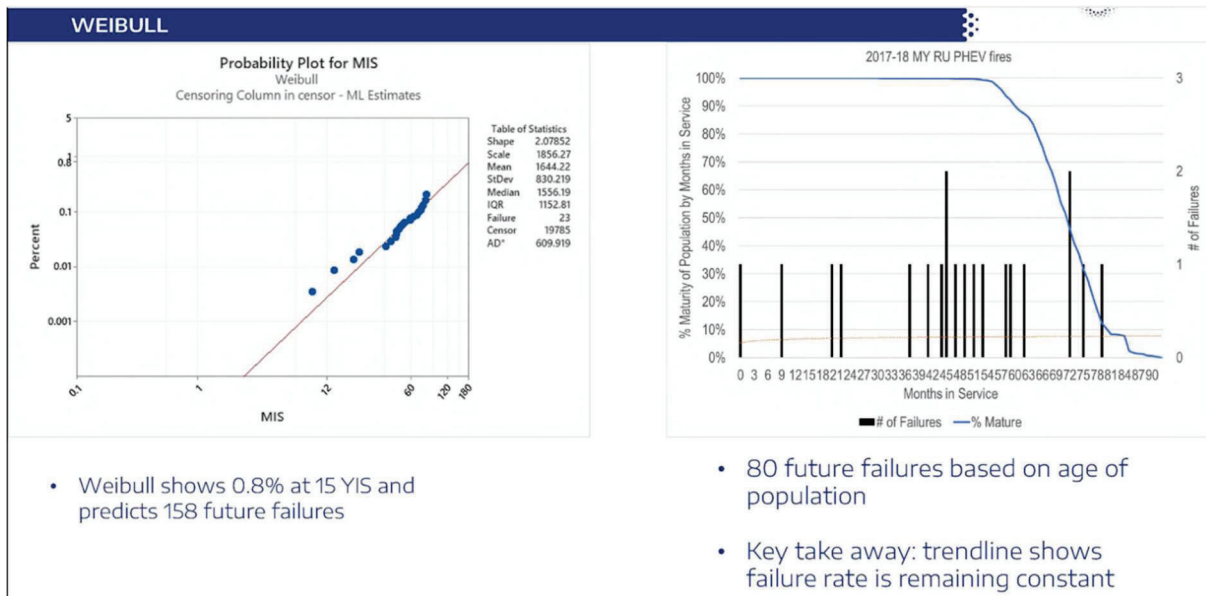


Figure 15. FCA analysis of projected failure (fire) rates.⁴²

According to FCA's analysis, LGES "believes the folded/torn anode is the biggest contributor to the root cause of the battery fires" and that "[t]hrough reproduction testing, LGES has determined that a second defect must exist which is contributing to the fires."⁴³ It goes on to say "there have been no manufacturing changes identified through the lifetime of production of RU PHEV (external to the battery) which can be attributed to the fires".⁴⁴ This last point refutes Mr. Leaphart's opinion that variations in Battery Electronic Control Module (BECM) software, external charging systems, or other vehicle system interfaces need to be considered as possible alternative root causes for the fire risk.⁴⁵

These twelve additional Class Vehicle fires and the supplemental root cause analysis, as well as the issuance of the 73B and 72B Recalls, support my opinion that the fire risk arises from the HV battery pack. Given the backward compatibility of the HV battery service part for the Class Vehicles (discussed above), and that FCA has determined the fire risk now also exists in certain MY2019-2021 Pacifica PHEVs (in addition to the MY2017-2018 Class Vehicles), my opinion that, generally, HV battery pack replacement is an available remedy for the fire risk still stands. However, it is modified to clarify that such replacement must utilize "clean" HV battery packs manufactured after any recall cutoff period.

⁴¹ FCA_Pacifica_MDL-455569

⁴² FCA_Pacifica_MDL-455569

⁴³ FCA_Pacifica_MDL-455552

⁴⁴ FCA_Pacifica_MDL-455553

⁴⁵ See E. Leaphart Feb. 19, 2024 Report at 3.7-3.8.

2.4 (Opinion 5.6) The Effectiveness of FCA's Z11 Recall Will Be Determined on a Class Wide Basis Using Evidence Common to All Class Vehicles

My opinions—that the effectiveness of the Z11 Recall software update can be shown class-wide and that HV battery pack replacements (with defect-free versions) are a competent and adequate solution for eliminating the fire risk—are bolstered by the 73B Recall and supplemental information learned about the Z11 Recall.

In the 73B Recall, FCA admits its software update provided under the Z11 Recall is ineffective and purports to be working on a new software fix for the Class Vehicles.⁴⁶ The Z11 Recall software update introduced three new Diagnostic Trouble Codes (“DTCs”) to monitor cell voltage deviation followed by a battery integrity procedure (“BIP”).⁴⁷ According to FCA, these DTC parameters included:

- Moving Average Voltage Deviation (“MAVD”) – detects intermittent short resulting in a momentary voltage change
- Relaxation delta Voltage (“RdV”) (short term and long term) – detects soft internal short in cell; an internal soft short can lead to a hard short over time, resulting in permanent battery damage
- Delta State of Health (“dSOH”) Capacity – detects abnormal deterioration of cell capacity due to external factors.⁴⁸

However, FCA concluded that these three DTCs implemented in the Z11 software update—MAVD, RdV, and dSOH—“do not detect certain abnormalities that may be occurring in the field.”⁴⁹

That conclusion was supported by the seven Class Vehicle fires, which resulted in four injuries, that originated from the Vehicles’ HV battery packs after the Z11 Recall software update was performed.⁵⁰ As illustrated in Figure 14 and Figure 15, the “fires continue to occur since launching Z11 remedy, most of which have had the Z11 remedy completed.”⁵¹ In all seven post-Z11 Recall incidents, the fires occurred while the Class Vehicles were keyed off.⁵² None of the vehicles had repair orders or data showing the customers returned to an FCA dealership with a DTC related to the Z11 Recall software update.⁵³ Notably, in one of the vehicles that had a fire, “No DTCs set between recall completion and fire but customer did note a ‘Service charging system’ on the dash at the time of fire.”⁵⁴ It was not stated how that vehicle flagged a service warning without triggering a DTC. A teardown analysis of one HV battery pack that had a fire found one torn anode tab suspected to be caused during manufacturing and a second torn anode

⁴⁶ <https://static.nhtsa.gov/odi/rci/2024/RCLRPT-24V536-8355.PDF>

⁴⁷ FCA_Pacifica_MDL-455570

⁴⁸ FCA_Pacifica_MDL-455570

⁴⁹ FCA_Pacifica_MDL-455571

⁵⁰ FCA_Pacifica_MDL-455557 to FCA_Pacifica_MDL-455574

⁵¹ FCA_Pacifica_MDL-455567

⁵² FCA_Pacifica_MDL-455559

⁵³ FCA_Pacifica_MDL-455559

⁵⁴ FCA_Pacifica_MDL-455559

tab suspected to be caused during the teardown analysis, but the vehicle scan report showed no DTCs related to the Z11 Recall software update.⁵⁵

The Z11 Recall also included a BIP where the vehicle is charged with rest periods followed by a final vehicle scan, which is “intended to catch batteries which may have severe voltage deviations at the dealership and minimize the chance of a customer having to return to the dealership. If the vehicle fails the BIP, the battery is replaced.”⁵⁶ The most recent Technical Service Bulletin (TSB) related to the Z11 Recall does not specify the HV battery service part number, but directs the technician to the STAR Center for HV battery replacement authorization.⁵⁷ In my prior industry experience at Ford, it is common practice for TSBs to not include specific service part numbers but instead direct the technician to replace the part with the latest available version; this prevents the need to issue new service information (e.g., TSBs) every time a service part number changes.

FCA reported that “most vehicles pass the BIP but return to the dealership sometime after the software is installed with a DTC” and noted that 206 Class Vehicles displayed a DTC while at the dealership for the Z11 Recall, while 808 Class Vehicles displayed a DTC in the days or months following completion of the Z11 Recall.⁵⁸ FCA concluded that “completion of the BIP is not an indication of software effectiveness”.⁵⁹

FCA reported that, under the Z11 Recall, only 855 vehicles had their HV battery pack replaced out of the total 19,808 vehicles included in the recall (full MY2017-2018 production, including US, Canada, and export, per **Error! Reference source not found.**).⁶⁰ It is unclear whether and which of those 855 HV battery pack replacements resulted from the 206 and 808 vehicles that set a DTC as noted above and how many occurred in the Class Vehicles (i.e., the US population). Overall, 855 HV battery pack replacements out of 19,808 vehicles reflects a more than 4% replacement rate. These replacements presumably occurred after the original battery failed the BIP during the Z11 Recall service procedure or a subsequent replacement after a triggered DTC.

This replacement rate is related to whatever diagnostic thresholds FCA used in the Z11 Recall. Unfortunately, even at that detection level, the Z11 Recall did not prevent additional fires, so the risk of fire remained for the Class Vehicle population. Based on my prior industry experience at Ford, a 4% replacement rate for any component would be considered high, especially for a part that:

- Has a high safety risk related to failure mode effect (e.g., risk of fire);
- Is an expensive service part to purchase either from a consumer cost or warranty cost perspective (retail cost of nearly \$12,000, as referenced in Figure 3);⁶¹

⁵⁵ FCA_Pacifica_MDL-455563-455566

⁵⁶ FCA_Pacifica_MDL-455570

⁵⁷ <https://static.nhtsa.gov/odi/rc1/2022/RCRIT-22V077-7220.pdf>

⁵⁸ FCA_Pacifica_MDL-455570

⁵⁹ FCA_Pacifica_MDL-455570

⁶⁰ FCA_Pacifica_MDL-455572

⁶¹ <https://store.mopar.com/oem-parts/mopar-mild-hybrid-motor-generator-unit-mgu-battery-pack-68488189aa?c=Zz1lbGVjdHJpY2FsJnM9YmF0dGVyeS1iYXR0ZXJ5LXRYXktYW5kLWNhYmxlcYzSPTEmbj1TZWFyY2ggUmVzdWx0cyZhPWNoZlZbGVyJm89cGFjaWZpY2EmeT0yMDE4JnQ9aHlicmlkLXRvdXJpbmctcGx1cyZlPTMtNmwtZlYtZWx1Y3RyaWMtZ2Fz>

- Requires an extensive service procedure to replace, including a 36-page TSB.⁶²

FCA reported that a vision system was implemented at LGES (LG Energy Solution) to screen out folded or torn anode tab defects in September 2019, and FCA used this anode tab vision check manufacturing cutoff to determine the vehicle population for the 72B Recall for MY2019-MY2021 Pacifica PHEVs.⁶³ However, it is currently unclear why MY2021 vehicles would be included in the 72B Recall as, in my experience, September 2019 would generally fall very early in the MY2020 production and not include the MY2021 production. Nevertheless, FCA appears to be using September 2019 as a clean point for fire risk defects related to anode tab in the HV battery manufacturing.

This supplemental information and the 73B Recall indicate that the Z11 Recall's software update was ineffective in eliminating the fire risk among all Class Vehicles, and assuming FCA can identify a clean point in later-produced HV battery packs, it reinforces my opinion that the fire risk can be remedied by replacing the HV battery packs with defect-free versions. As part of the Z11 Recall, a number of HV batteries were replaced, presumably after failing diagnostic thresholds during BIP or after the Z11 Recall. In the 73B Recall FCA stated, "*Similar vehicles not included in the recall are not PHEV, have received a HV battery replacement after completing Z11, or were built after the suspect vehicle production period.*"⁶⁴ (Emphasis added.) As FCA appears to be confident that HV battery replacements with later-produced service parts do not contain the anode tab defect risk, the remedy of replacing HV batteries remains one way to ensure the fire risk is competently and adequately addressed in the Class Vehicles.

November 12, 2024



Bradley T. Zigler, Ph.D.

⁶² <https://static.nhtsa.gov/odi/rci/2022/RCRIT-22V077-7220.pdf>

⁶³ FCA_Pacifica_MDL-455552 to FCA_Pacifica_MDL-455553

⁶⁴ <https://static.nhtsa.gov/odi/rci/2024/RCLRPT-24V536-8355.PDF>